

# Rhodora

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### NOTES ON AMERICAN RORIPPA (CRUCIFERAE)

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One of the most distinctive American species of *Rorippa* is *R. sinuata* (Nutt.) Hitchcock. This is because of the perennial habit and the fact that the trichomes are unusual, being somewhat vesicular and hemispherical in shape rather than elongated and pointed. On dried specimens, the trichomes appear to be flat and scale-like because they are collapsed. These are present rather sparsely along the midribs of the under sides of the leaves and on the stems on specimens from the plains states, but an increase in the abundance of trichomes and a more extensive coverage of the plants occur on material from extreme western Texas to Arizona and northward through the Rocky Mountains and to the westward in the Columbia River valley (with certain exceptions mentioned below) and in the Great Basin region. Evidently these hemispherical-shaped trichomes are not wholly persistent, for they may be seen on the young foliage and pedicels of some specimens where they are completely absent from the mature leaves and pedicels. Ordinarily, the siliques are glabrous but plants with the greatest density of trichomes have them extending to the fruits, where they may be restricted to the valve edges next to the replum or they may extend to cover the entire valve surface. A specimen from southwestern Colorado collected by T. S. Brandegee apparently impressed Gray (1876) because of the roughness produced by the dense covering of trichomes on the siliques. This specimen became the type of *Nasturtium trachycarpum* Gray. According to Kearney and Peebles (1951) only the pubescent-fruited form occurs in Arizona.

However, neither the extent nor the abundance of these peculiar vesicular trichomes is a safe basis for any taxonomic separations and, accordingly, *N. trachycarpum* should be treated as a straight synonym of *Rorippa sinuata*.

*Rorippa sinuata* occurs in patches, due to the spreading of the plants by underground roots. The species appears to be adapted to disturbed soils and finds roadsides and railroad banks suitable for vigorous growth. It is not certain that it is actively increasing its geographic range but it could easily be doing so because such excellent pathways as transcontinental highways are open to it. The geographic range of *R. sinuata* appears to be from Saskatchewan and Minnesota south to Arkansas and Texas, west to Arizona and north to Washington. Munz and Keck (1959) cited it from Little Lake, Inyo County, and Modoc County, California, and these are likely areas in which to find plants of more easterly and northerly distribution. However, I have not personally seen California specimens of *R. sinuata*.

#### THE TYPE OF RORIPPA SINUATA

*Nasturtium sinuatum* was published by Torrey and Gray (1838) from Nuttall's manuscript, where "banks of the Oregon and its tributaries; also in Arkansas" are given as source localities. On the sheet bearing the type in the British Museum, two collections are present. One of these is marked "Sisymbrium sinuatum Arkansas", the other, "Nasturtium sinuatum Columbia River & Arkansas." The specimen marked "Arkansas" and the sterile shoot on the right [one of three fragments] of the second designation resemble very closely modern material from Arkansas, Oklahoma and Texas that is regularly referred to *R. sinuata*. The other two fragments are similar to modern specimens from the Columbia River valley but, in contrast to most of the material of *R. sinuata*, they are nearly glabrous. Unfortunately, I used only a hand-lens in examining these specimens while I was at the British Museum in 1950 and I cannot now say with certainty that there are absolutely none of the characteristic vesicular trichomes present on them. In other respects, the Arkansas and Columbia River specimens appear to be similar enough to represent but a single species. How-

ever, it was disturbing to find that the Nuttall specimen in the British Museum marked "Nasturtium curvisiliqua Columbia Shores" does have a conspicuous covering of vesicular trichomes and it certainly represents the species we think of as *Rorippa sinuata*. A Nuttall collection in the Gray Herbarium marked "Nasturtium curvisiliqua. Sisymbrium Hooker. Oregon River", in Nuttall's handwriting, has two fragments; one is *Rorippa sinuata*, the other not determinable with certainty but definitely not *R. sinuata*. These latter must be the specimens mentioned by Torrey and Gray (l.c.) as differing from the description of *Sisymbrium curvisiliquum* Hooker. It appears to me that Nuttall either made mixed collections of *Rorippa* along the Columbia River or his collections were subsequently mixed. We know from Nuttall's own collection and from *Suksdorf 2430* near Bingen, with vesicular trichomes, and *Suksdorf 2103*, W. Klickitat County (glabrous or nearly so) that both types occur along the lower Columbia in Washington. I am satisfied that the two *Suksdorf* collections should be accommodated in the same species and it appears that no real difficulties will arise from accepting the Columbia River specimens on the type sheet at the British Museum as the holotype of *R. sinuata*. However, it does mean that the holotype is somewhat atypical of the species as a whole.

One source of some confusion, with regard to the typification of *Rorippa curvisiliqua*, is Torrey and Gray's (l.c.) treatment of *Nasturtium curvisiliqua* in such a way that their intent was not made clear. Nuttall was merely given credit for the transfer of *Sisymbrium curvisiliqua* Hooker to the genus *Nasturtium*. Thus, Howell (1897) assumed that *Nasturtium curvisiliqua* of Nuttall was the basionym of *Rorippa curvisiliqua* rather than the rightful *Sisymbrium curvisiliquum* of Hooker. Actually Nuttall did not intend to publish *Nasturtium curvisiliqua* as a new species and this was not done for Nuttall by Torrey and Gray.

#### OTHER SPECIES WITH VESICULAR TRICHOMES

One reason for a careful review of the variation and distribution of *Rorippa sinuata*, as given above, was to provide the basis for a proper assessment of specimens from Mexico

that share many technical characteristics with it, including the possession of vesicular trichomes. A critical comparison of the Mexican material with *R. sinuata* shows that the specimens do not belong to it but represent a closely related undescribed species.

***Rorippa ramosa* Rollins, sp. nov.**

Prostrate dense perennial, up to 10 dm. in diameter; stems numerous, highly branched, sparsely pubescent with vesicular trichomes, 3-6 dm. long, branches present in the axil of nearly all leaves from base to apex of each stem; more generally pubescent than principal stems; leaves numerous, sessile, auriculate, thick, greyish-green, oblong to broadly lanceolate, pinnately lobed, 3-5 cm. long, 5-12 mm. wide, lobes confluent toward base; midrib prominent on lower surface of leaf, pubescent with vesicular trichomes; inflorescences short, mostly less than 5 cm. long; sepals oblong, glabrous or with a few trichomes present on the dorsal surface, hyaline-margined, non-saccate, 2-2.5 mm. long; petals pale yellow, spatulate, not differentiated into blade and claw, 2.5-3 mm. long, 0.75-1 mm. wide; pedicels widely spreading to ascending, straight to slightly curved outward, sparsely covered with trichomes, 3-5 mm. long, expanded at summit; siliques divaricately spreading to erect, slightly curved inward, oblong to lanceolate, plump, obtuse below, tapering above, 6-10 mm. long, valves densely covered with vesicular trichomes along their margins; styles glabrous, 1.5-2.5 mm. long; ovules numerous, funiculi slender; seeds plump, cordiform, ca. 1.5 mm. in diameter, seed coat colliculate (cf. Murley, 1951) and lustrous; cotyledons accumbent. Fig. A-C.

Herba perennis procumbens, caulibus numerosis ramosis 3-6 dm. longis; foliis crassis sessilibus auriculatis oblongis vel late lanceolatis pinnatilobatis costatis 2-3 cm. longis 4-12 mm. latis sparse pubescentibus; sepalis non-saccatis oblongis 2-2.5 mm. longis; petalis flavis spathulatis 2.5-3 mm. longis; pedicellis divaricatis vel adscendentibus sparse pubescentibus 3-5 mm. longis; siliquis oblongis vel lanceolatis ad basi obtusis 6-10 mm. longis sparse pubescentibus; stylis glabris 1.5-2.5 mm. longis; ovulis numerosis; seminibus cordiformibus colliculatis; cotyledonibus accumbentibus.

Type in the Gray Herbarium, collected in a dry arroyo, 3 miles northwest of Ceballos, Durango, Mexico, May 4, 1959, *D. S. Correll* and *I. M. Johnston 21449*. Isotype in the Lundell Herbarium of the Texas Research Foundation.

An additional collection of *Rorippa ramosa* is: San Lorenzo de Laguna, 70 miles south of Parras, Coahuila, May, 1880, *E. Palmer 34* (GH, US).

The general habit of growth of *Rorippa ramosa* is that of a densely leafy, highly ramified, flat, nearly circular plant.



FIG. A-C. *Rorippa ramosa*. FIG. A. habit sketch,  $\times \frac{1}{2}$ . FIG. B. silique  $\times 2$ . FIG. C. replum showing numerous funiculi,  $\times 2$ . Drawings by C. S. Tsao.

It is possible that there are basal leaves on the young plants but none are evident on the mature specimens I have studied. It is more probable that a truly basal rosette of leaves is not a characteristic of the species. The illustration, fig. 1A, even though it shows only a portion of two main stems, gives an approximate idea of the intricate branching present.

In habit alone, *R. ramosa* differs strikingly from *R. sinuata*. I have collected *R. sinuata* four times in Kansas, Colorado and Wyoming and in each instance colonies were found with the individual plants interconnected underground. Usually a single stem, or at most three or four, emerges at a given locus. In contrast to this, *R. ramosa* has numerous stems arising at the summit of what appears on the specimens to be a tap-root. An important difference between the two species is in the size of the flowers. Those of *R. sinuata* are more than twice the size of the flowers of *R. ramosa*, the petals being over twice the width. The outer sepals of *R. sinuata* are saccate while those of *R. ramosa* are non-saccate. Other differences include the shorter, more erect and stouter pedicels, more lanceolate-shaped fruits, shorter styles, less angular seeds and more prominently colliculate seed-coats of *R. ramosa* as compared with *R. sinuata*. The leafiness of the branches, relatively short infructescences and repeated branching give *R. ramosa* a distinctive overall appearance.

*Rorippa ramosa* is unquestionably related to *R. sinuata* from which it is geographically isolated. I have not seen any other material from Mexico that falls into this alliance within the genus.

**Rorippa Walteri** (Ell.) Mohr, Bull. Torr. Bot. Club 24:  
23, 1897.

A photograph of the type of *Sisymbrium Walteri* Elliott in the Gray Herbarium leaves no doubt as to the application of this name to plants that have at times been placed under *Nasturtium tanacetifolium* H. and A. (cf. Schulz, 1933). The type of *S. Walteri* is in the Charleston Museum of Charleston, South Carolina. There seems little doubt that Elliott's renaming of the plants tentatively identified as

*Sisymbrium tanacetifolium* by Walter (1788) provides the first available name clearly applied to this species. The only justification for taking up the specific name *tanacetifolium* would be to consider it to have been newly proposed by Hooker and Arnott, as has been done quite often, as a renaming in another genus of the Walter described species. Hooker and Arnott (1834) did cite Walter and it is clear that they had his description in mind. However, if the name were to date from their work, it would even then not take priority over Elliott's *Walteri*. Walter did not cite Linnaeus as the author of *Sisymbrium tanacetifolium* in his book but he did use a question mark after *tanacetifolium*. It is inconceivable that he would have questioned the application of a name he was himself proposing.

*Rorippa Walteri* occurs from South Carolina southward to Florida and westward, largely on the coastal plain, through Texas; on the eastern and western lowlands of Mexico and at least in Nicaragua in Central America. For the present study, I have not tried to determine the total geographic range of the species. It is possible that *R. Walteri* has been carried by man somewhat outside of its natural range in Mexico and Central America because it is used as a salad plant, and it may be seen in the local markets of western Mexico. As in most species of *Rorippa*, there is considerable variation in the leaf-pattern and habit of growth. These features are strongly influenced by the conditions of moisture and light under which the plants grow.

Vesicular trichomes, somewhat longer and more constricted toward the base than those in *Rorippa sinuata*, are found on plants of *R. Walteri*, especially on the lower portions of the stems. The abundance decreases upward, often resulting in glabrousness on the upper parts of the plant. This distribution of trichomes is characteristic of specimens from the Atlantic slope of Mexico to South Carolina but most of the material from the Pacific slope of Mexico shows a different trichome distribution. Specimens from Nayarit to Sonora, and the single specimen I have seen from Nicaragua, have glabrous stems but vesicular trichomes are pres-

ent on the siliques. Specimens from Colima and Oaxaca are similar to those of the eastern range of the species. There appears to be a trend toward shorter pedicels and more unevenly divided leaves in the western Mexican material. Furthermore, it seems that drier habitats are the rule in the western as compared to the eastern part of the range. All of these correlated characteristics, coupled with geographic segregation, suggest a divergent trend that may eventually result in separable taxa. At the present time, evidences of continuity throughout the species are found in a variety of structures and it seems wise to view the whole as a single species, although the addition of new knowledge might well require a revision in the direction of a recognition of a larger number of entities.

*Rorippa Walteri* is most easily recognized by the pinnately compound lower leaves with the leaflets at least dentate and often deeply lobed; the short (1-3 mm.) divaricate pedicels; minute flowers; terete, divaricately ascending siliques; prominent styles and the distinctive, somewhat clavate vesicular trichomes either on the stems or the siliques or occasionally on both. A selection of specimens is cited below to aid in interpreting this species.

UNITED STATES. **South Carolina:** Beaufort, *J. R. Churchill 432* (GH); St. Johns, Berkeley, *H. W. Ravenel s. n.* (GH). **Florida:** 4 miles n. Crawfordville, Wakulla Co., *Godfrey and Almodovar 52975* (GH); dried bottom of Lake Jackson, Leon Co., *Hunnewell 13048* (GH); near Jacksonville, Duval Co., *A. H. Curtiss 4589* (GH). **Mississippi:** 3 miles from Laurel, Jones Co., *Cooley and Pease 3104* (GH); near Natchez, *Sullivant s. n.* (GH). **Louisiana:** New Orleans, *T. Drummond 18* (GH). **Oklahoma:** Sapulpa, *B. F. Bush 1233* (GH). **Texas:** Conquista Crossing, between Falls City and Deweesville, Karnes Co., *Johnston 1462* (GH); Corpus Christi, Nueces Co., *Heller 1487* (GH); Bastrop, Bastrop Co., *E. J. Palmer 33381* (GH); Santa Elena Canyon, Brewster Co., *Goodman and Waterfall 4653* (GH). **MEXICO. Tamaulipas:** near Matamoros, April, 1831, *Berlandier 879* (GH). **Vera Cruz:** Jalapa, *Pringle 8087* (GH, US); Cordoba, *Orcutt 3134* (GH, US). **Sonora:** vicinity of Alamos, *Rose, Standley and Russell 13012* (GH, US); vicinity of Culiacán, *Rose, Standley and Russell 14974* (GH, US); 12 miles west of Culiacán, *Gentry 7004* (GH). **Nayarit:** vicinity of Acaponeta, *Rose, Standley and Russell 14246* (US). **Colima:** Manzanillo, *Palmer 1344* (GH). **NICARAGUA. Zelaya:** Rio Grande, *Antonio Molina R. 2172* (US).



*Rorippa portoricensis* (Sprengel) Stehlé, Rev. Bot. Appliq. 26: 103. 1946.

This name is based on *Nasturtium portoricensis* Sprengel (1825) which appears to have been described from the same Bertero collection cited from Puerto Rico as that used by De Candolle (1821) as the basis for *Nasturtium palustre* var. *brevipes*. De Candolle's var. *brevipes* was first raised to specific rank by Grisebach in 1860 and the name *Nasturtium brevipes* (DC.) Griseb. was used by Schulz in various papers on the Cruciferae of the West Indies. However, the oldest and the correct specific name appears to be *portoricensis*.

The relationship of *R. portoricensis* to *R. Walteri* is a very close one and there is some question as to whether an interpretation of the existing evidence as indicating a single species, probably with the recognition of a West Indian variety, is not more realistic than the acceptance of two species. Watson, in the Synoptical Flora of North America (1895), did treat the West Indian material as *Nasturtium tanacetifolium* var. *insularum*. At that time, *N. tanacetifolium* was in common use for the species now known as *Rorippa Walteri*. However, a broader and more detailed study of the genus *Rorippa* than is at present possible is much needed, and should be looked to for the settling of many such difficult questions of taxonomic interpretation as that posed by *R. portoricensis*.

Assuming for the present that *R. portoricensis* is a good species, the material I have seen shows it to be present in Cuba, the Dominican Republic and Puerto Rico. The principal differences from *R. Walteri* are shown by the siliques, which are shorter with a nearly sessile stigma instead of a definite style, and the shorter, more ascending pedicels. Vesicular trichomes similar to those of *R. Walteri* are present on the lower stems and usually the valve-margins of the Cuban specimens and at least along the valve-margins of the siliques (only occasionally on the lower stems) of the material from the Dominican Republic and Puerto Rico. These are the same two trichome distribution patterns found in *R. Walteri*. The following specimens have been determined as *R. portoricensis* in the present study.

CUBA. *F. Rugel 235* (GH); **Pinar del Rio:** Galafre, *Britton and Cowell 9826* (GH); Las Guaaimas, *O'Donovan 4687* (GH); Santa Catarine, *C. Wright*, Feb. 1860 (GH); "in Cuba Orientali". *C. Wright 1562* (GH). DOMINICAN REPUBLIC: Pontezuela, *Jiménez 2565* (US); Constanza, *Türckheim 3031* (GH, US); La Estancia, *Ekman 12124* (A, US); La Cumbre, *Raunkier 1084* (US). PUERTO RICO: Cabo-Rojo, *Sintenis 699* (GH); Adjuntas, *Sintenis 4033* (US); Añasco, *Sintenis 5625* (GH). — GRAY HERBARIUM OF HARVARD UNIVERSITY.

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## A RE-EVALUATION OF THE GENERIC STATUS OF ASCYRUM AND CROOKEA (GUTTIFERAE)

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Recent intensive studies of the floral anatomy and taxonomy of *Hypericum* and the segregates *Ascyrum* and *Crookea* have led to a re-evaluation of the generic status of these groups. A general review and study of the floral anatomy of *Hypericum* and related genera by Robson (1956) indicates that the species belonging to *Ascyrum*, *Crookea* and the sections *Myriandra* and *Brathydium* of *Hypericum* are closely related to each other. Recent studies by Adams (1959) in the taxonomy of these species appear to confirm Robson's idea that they form a very natural group. In the following discussion we will present evidence supporting the